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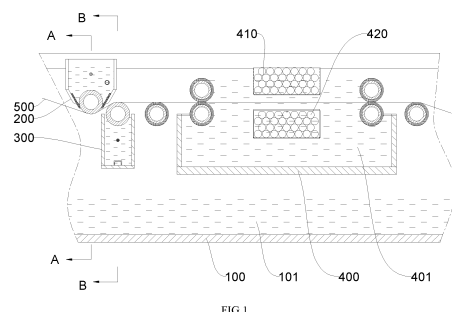
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(54) **DEVICE AND METHOD FOR PREVENTING CONDUCTIVE ROLLER FROM BEING PLATED WITH COPPER**

(57) The present invention discloses a device and method for preventing copper plating of a conductor roll in the technical field of manufacturing of copper electroplating films. A conductor roll and an electroplating anode are respectively connected to a negative output end and a positive output end of a first power source, the conductor roll and the electroplating anode electroplate a plating product passing through plating pool bath after being electrified, the conductor roll is connected to a positive output end of a second power source, and an auxiliary electrode is connected to a negative output end of the second power source accordingly for electrolyzing the conductor roll so as to prevent copper deposition on the conductor roll when electroplating the plating product. The present invention can realize the electrolysis of bath near the conductor roll on the premise of completing electroplating by the conductor roll so that the copper electroplating process and the copper electrolyzing process are balanced on the conductor roll to avoid residual copper on the conductor roll so as to improve the copper plating quality of the plating product, and the present in-

vention does not increase the procedure of the electroplating process or affect the implementation of the electroplating process.



Description

Technical Field

[0001] The present invention relates to the technical field of manufacturing of copper electroplating films, and particularly relates to a device and method for preventing copper plating of a conductor roll.

Background

[0002] During the process of copper film electroplating, a plating surface will have a certain amount of bath. When the plating product is in contact with the conductor roll in the process of rolling over the conductor roll for electroplating, the bath may also be in contact with the conductor roll to cause an electroplating reaction between the bath and the conductor roll so that a large area of copper is deposited on the surface of the conductor roll, and the deposited copper will have a great impact on the production of films. For example, copper particles or spines deposited at a certain point will pierce or scratch films, which affects the quality of the plating product.

[0003] To solve this problem, the frequently-used copper removal method in the industry is a physical method, and the conductor roll is sprayed and cleaned by physical methods, or copper on the surface of the conductor roll is removed with a scraper. For example, a Chinese patent with a publication number of CN202898572U discloses a device for preventing copper plating of a conductor roll, which cleans up residual copper powder on the conductor roll by arrangement of a spraying pipe on the bottom of the conductor roll so as to prevent copper electroplating of the conductor roll.

[0004] However, the existing physical methods can only remove the deposited copper formed on the surface of the conductor roll, which cannot remove residual copper particles on the surface of the conductor roll completely or meet the requirements of non-metallic copper plating, and affects effective components of the bath so as to affect the copper plating effect. Moreover, such copper removal methods require additional steps to remove copper in the process of copper plating, which makes the equipment implementation process more complicated

[0005] The above defects are worth improving.

Summary

[0006] To overcome the defects in the prior art, the present invention provides a device and method for preventing copper plating of a conductor roll.

[0007] The present invention has the following technical solution:

A device for preventing copper plating of a conductor roll, comprising:

An electroplating pool, wherein plating pool bath and an electroplating anode are arranged in the electro-

plating pool;

An auxiliary tank, in which auxiliary tank bath, an auxiliary electrode completely immersed in the auxiliary tank bath, and a conductor roll partly immersed in the auxiliary tank bath are arranged, and a plating product rolls over the conductor roll which is not immersed in the auxiliary tank bath, and passes the electroplating anode;

The auxiliary tank bath is communicated with the plating pool bath, the electroplating anode is connected to a positive output end of a first power source, one end of the conductor roll is connected to a negative output end of the first power source, the other end of the conductor roll is connected to a positive output end of a second power source, and the auxiliary electrode is connected to a negative output end of the second power source.

[0008] The present invention according to the above solution, wherein the auxiliary tank comprises an upper auxiliary tank with an opening on a lower end, an upper conductor roll is arranged at the opening, the upper conductor roll is hermetically connected with the upper auxiliary tank, an upper side of the upper conductor roll is immersed in upper tank bath in the upper auxiliary tank, a lower side is exposed from the upper auxiliary tank, and the plating product rolls over the lower side of the upper conductor roll.

[0009] Further, an upper auxiliary electrode is arranged in the upper tank bath, and the upper auxiliary electrode is located directly above the upper conductor roll.

[0010] Further, sides of the upper auxiliary tank are provided with an upper bath inlet and an upper bath outlet, and the upper tank bath and the plating pool bath are communicated through the upper bath inlet and the upper bath outlet.

[0011] The present invention according to the above solution, wherein the auxiliary tank comprises a lower auxiliary tank with an opening on an upper end, a lower conductor roll is arranged at the opening, a lower side of the lower conductor roll is immersed in lower tank bath in the lower auxiliary tank, an upper side is exposed from the lower tank bath, and the plating product rolls over the upper side of the lower conductor roll.

[0012] Further, a lower auxiliary electrode is arranged in the lower tank bath, and the lower auxiliary electrode is located directly below the lower conductor roll.

[0013] The present invention according to the above solution, wherein an end of the auxiliary electrode is connected with an electrode wire, and the electrode wire is connected with the negative output end of the second power source; and ends of the conductor roll are connected with conductive slip rings through conducting bars, the conductive slip ring located on one end of the conductor roll is connected with the negative output end of the first power source, and the conductive slip ring located on the other end of the conductor roll is connected

with the positive output end of the second power source.

[0014] In another aspect, a method for preventing copper plating of a conductor roll, comprising: connecting a conductor roll to a negative output end of a first power source, connecting an electroplating anode to a positive output end of the first power source, electroplating a plating product passing through plating pool bath by the conductor roll and the electroplating anode after being electrified, further comprising an electrolyzing step of the conductor roll: connecting the conductor roll to a positive output end of a second power source and connecting an auxiliary electrode to a negative output end of the second power source accordingly for electrolyzing the conductor roll so as to prevent copper deposition on the conductor roll when electroplating the plating product.

[0015] The present invention according to the above solution, comprising: arranging an auxiliary tank, partly immersing the conductor roll in auxiliary tank bath in the auxiliary tank, connecting an auxiliary electrode in the auxiliary tank to the negative output end of the second power source, and connecting the conductor roll to the positive output end of the second power source, for electrolyzing of the conductor roll through the second power source, the auxiliary electrode and the auxiliary tank bath.

[0016] The present invention according to the above solution, comprising: connecting one end of the conductor roll to the negative output end of the first power source, and connecting the other end to the positive output end of the second power source.

[0017] The present invention according to the above solution has the following beneficial effects: an electrolysis device for the conductor roll is added before electroplating, and by adding an auxiliary electrode connected in series with the conductor roll, the bath in the auxiliary tank forms a loop, the conductor roll acts as an anode for electrolysis, and the electrolysis of the bath near the conductor roll can be realized on the premise of completing electroplating by the conductor roll so that the copper electroplating process and the copper electrolyzing process are balanced on the conductor roll to avoid residual copper on the conductor roll so as to improve the copper plating quality of the plating product. The present invention has simple structure in the whole device and only needs a small electrolytic cell to realize the whole function without increasing the procedure of the electroplating process or affecting the implementation of the electroplating process.

Description of Drawings

[0018]

Fig. 1 is a structural schematic diagram of the present invention;

Fig. 2 is a structural schematic diagram of an upper auxiliary tank and a lower auxiliary tank;

Fig. 3 is a section view of A-A in Fig. 1;

Fig. 4 is an amplified view of part C in Fig. 3;

Fig. 5 is an amplified view of part D in Fig. 3;

Fig. 6 is a section view of B-B in Fig. 1;

Fig. 7 is an amplified view of part E in Fig. 6;

Fig. 8 is an amplified view of part F in Fig. 6;

Fig. 9 is a top view of the present invention;

Fig. 10 is a circuit diagram for implementation of the present invention.

[0019] In the figures, 01-first rectifier; 02-second rectifier;

100-main body tank; 101-main tank bath; 110-first main tank vertical plate; 120-second main tank vertical plate; 130-third main tank vertical plate;

200-upper auxiliary tank; 201-upper tank bath; 210-upper tank body; 211-seal plate; 220-upper conductor roll; 221-upper bearing; 222-upper conducting bar; 223-upper conductive slip ring; 230-upper auxiliary electrode; 231-upper electrode wire; 241-upper bath inlet; 242-upper bath outlet;

300-lower auxiliary tank; 301-lower tank bath; 310-lower tank body; 320-lower conductor roll; 321-lower bearing; 322-lower conducting bar; 323-lower conductive slip ring; 330-lower auxiliary electrode; 331-lower electrode wire; 340-distribution pipe; 341-lower bath inlet; 342-distribution hole;

400-electroplating pool; 401-plating pool bath; 410-upper electroplating anode; 420-lower electroplating anode;

500-plating product.

Detailed Description

[0020] The present invention is further described below in combination with the drawings and embodiments.

[0021] A method for preventing copper plating of a conductor roll, comprising: connecting a conductor roll to a negative output end of a first power source, connecting an electroplating anode to a positive output end of the first power source, connecting the positive output end of the first power source, the electroplating anode, bath, the conductor roll and the negative output end of the first power source in sequence to form an electroplating loop, and electroplating a plating product passing through the electroplating pool by the conductor roll and the electroplating anode after being electrified.

[0022] With the progress of electroplating, more copper particles are deposited on the surface of the conductor roll. To avoid copper deposition on the conductor roll under the influence of the nearby bath, the synchronous electrolysis of the conductor roll is also carried out in the process of electroplating realized by the conductor roll and the electroplating anode. That is, the conductor roll is connected to a positive output end of a second power source, and an auxiliary electrode is connected to a negative output end of the second power source accordingly for electrolyzing the conductor roll so as to prevent copper deposition on the conductor roll when electroplating the

plating product.

[0023] To realize the electrolysis of the bath near the conductor roll, an auxiliary tank is arranged in the position of the conductor roll, the conductor roll is partly immersed in auxiliary tank bath in the auxiliary tank, an auxiliary electrode in the auxiliary tank and the conductor roll are respectively connected to the negative output end and the positive output end of the second power source, and the positive output end of the second power source, the conductor roll, the auxiliary tank bath, the auxiliary electrode and the negative output end of the second power source are connected in sequence to form an electrolysis loop. The electrolysis of the conductor roll is realized through the second power source, the auxiliary electrode and the auxiliary tank bath. As different electroplating devices have different structures, the specific arrangement position of the conductor roll is different, so the auxiliary tank can be located in different positions of the whole electroplating device, and the specific installation position is not limited here.

[0024] The present invention makes the conductor roll act as a cathode when electroplating the plating product and act as an anode for copper electrolysis when mating with the auxiliary electrode by adding the auxiliary tank, the auxiliary electrode and the auxiliary tank bath and adding an electrolysis loop in the auxiliary tank, which realizes the balance of copper electroplating and copper electrolysis on the conductor roll. To realize the simultaneous connection of the conductor roll to the first power source and the second power source, in the present invention, one end of the conductor roll is connected to the negative output end of the first power source, and the other end is connected to the positive output end of the second power source.

[0025] As shown in Fig. 1 to Fig. 9, a device for preventing copper plating of a conductor roll, used for realizing the method for preventing copper plating of a conductor roll, comprises an electroplating pool 400 and an auxiliary tank arranged in front of the electroplating pool 400. Plating pool bath 401 and an electroplating anode are arranged in the electroplating pool 400, the electroplating anode is connected to a positive output end of a first power source, one end of a conductor roll is connected to a negative output end of the first power source, and the electroplating anode and the conductor roll interact with each other through the plating pool bath 401 to realize the electroplating of a plating product 500. Preferably, the auxiliary tank is made of PVC sheets or other acid and alkali corrosion resistant materials besides PVC to adapt to the electroplating or electrolyzing environment of the bath.

[0026] Auxiliary tank bath, an auxiliary electrode immersed in the auxiliary tank bath and the conductor roll partly immersed in the auxiliary tank bath are arranged in the auxiliary tank, and the plating product 500 rolls over the conductor roll which is not immersed in the auxiliary tank bath, and passes the electroplating anode. The auxiliary electrode is arranged in parallel to the conductor

roll, the other end of the conductor roll is connected to a positive output end of a second power source, the auxiliary electrode is connected to a negative output end of the second power source, and the conductor roll and the auxiliary electrode interact with each other through the auxiliary tank bath for electrolyzing the conductor roll and the nearby auxiliary tank bath. To ensure the interaction of the conductor roll and the electroplating anode and realize the electroplating process, the auxiliary tank bath is communicated with the plating pool bath 401.

[0027] Preferably, the auxiliary electrode is a copper bar, and also can be a copper bar, a titanium bar, a stainless steel bar, a titanium clad copper, etc.

[0028] As show in Fig. 1 to Fig. 5 and Fig. 9, in the process of electroplating an upper surface of the plating product 500, the plating product 500 rolls over a lower surface of the conductor roll and enters the electroplating pool 400, and the electroplating anode in the electroplating pool 400 is located above the plating product 500.

[0029] For the conductor roll in such connection form, an upper auxiliary tank 200 is arranged in front of the electroplating pool 400, specifically: the upper auxiliary tank 200 comprises an upper tank body 210, a lower end of the upper tank body 210 is provided with an opening, and an upper conductor roll 220 is arranged at the opening. Preferably, a bottom of the upper tank body 210 is trapezoidal.

[0030] An upper side of the upper conductor roll 220 is immersed in upper tank bath 201 in the upper auxiliary tank 200, a lower side is exposed from the upper auxiliary tank 200, and the plating product 500 rolls over the lower side of the upper conductor roll 220. An upper electroplating anode 410 is arranged in the electroplating pool 400 to be mated with the upper conductor roll 220, and the plating product 500 penetrates through a lower side of the upper electroplating anode 410. Preferably, in a cross section of the upper conductor roll 220, a part located in the upper auxiliary tank 200 is larger than that located outside the upper auxiliary tank 200, which will not affect the contact between the upper conductor roll 220 and the plating product 500 and can increase the contact area between the upper conductor roll 220 and the auxiliary tank bath.

[0031] To avoid leakage, the upper conductor roll 220 is hermetically connected with the upper auxiliary tank 200. A seal plate 211 is arranged at the opening in the embodiment, the upper conductor roll 220 is hermetically connected with the upper auxiliary tank 200 through the seal plate 211. Preferably, the seal plate 211 is a hypalon seal to ensure that no serious leakage occurs in the position of the opening.

[0032] An upper auxiliary electrode 230 is arranged in the upper tank bath 201, and the upper auxiliary electrode 230 is located directly above the upper conductor roll 220, which can ensure that the current distribution in the upper auxiliary tank 200 is more uniform and ensure the balance of the electroplating process and the electrolyzing process. To ensure the normal electroplating process

and electrolyzing process, the level of the upper tank bath 201 is higher than a lower surface of the upper auxiliary electrode 230, and the level of the plating pool bath 401 is higher than a lower surface of the upper electroplating anode 410. In the embodiment, the upper auxiliary electrode 230 is completely immersed in the upper tank bath 201, which can make the current transfer more uniform and the current distribution in the upper tank bath 201 more uniform when the upper auxiliary electrode 230 is used as a negative pole for copper electrolysis.

[0033] An end of the upper auxiliary electrode 230 is connected with an upper electrode wire 231, and the upper electrode wire 231 is connected with the negative output end of the second power source; and ends of the upper conductor roll 220 are connected with upper conductive slip rings 223 through upper conducting bars 222, the upper conductive slip ring 223 located on one end of the upper conductor roll 220 is connected with the negative output end of the first power source, and the upper conductive slip ring 223 located on the other end of the upper conductor roll 220 is connected with the positive output end of the second power source.

[0034] Sides of the upper auxiliary tank 200 are provided with an upper bath inlet 241 and an upper bath outlet 242, and the upper tank bath 201 and the plating pool bath 401 are communicated through the upper bath inlet 241 and the upper bath outlet 242. Preferably, the upper bath outlet 242 and the upper bath inlet 241 are located on both ends of the upper tank body 210 to ensure that the bath in the upper auxiliary tank 200 can fully react before flowing out. Further preferably, the upper bath outlet 242 is higher than the upper bath inlet 241, which can also promote the balanced reaction of the bath in the upper auxiliary tank 200.

[0035] As shown in Fig. 1, Fig. 2, Fig. 6 and Fig. 9, in the process of electroplating a lower surface of the plating product 500, the plating product 500 rolls over an upper surface of the conductor roll and enters the electroplating pool 400, and the electroplating anode in the electroplating pool 400 is located below the plating product.

[0036] For the conductor roll in such connection form, a lower auxiliary tank 300 is arranged in front of the electroplating pool 400, specifically: the lower auxiliary tank 300 comprises a lower tank body 310, an upper end of the lower tank body 310 is provided with an opening, and a lower conductor roll 320 is arranged at the opening.

[0037] A lower side of the lower conductor roll 320 is immersed in lower tank bath 301 in the lower auxiliary tank 300, an upper side is exposed from the lower tank bath 301, and the plating product 500 rolls over the upper side of the lower conductor roll 320. A lower electroplating anode 420 is arranged in the electroplating pool 400 to be mated with the lower conductor roll 320, the lower electroplating anode 420 is immersed in the plating pool bath 401, and the plating product 500 penetrates through an upper side of the lower electroplating anode 420. A lower auxiliary electrode 330 is arranged in the lower tank bath 301, and the lower auxiliary electrode 330 is located

directly below the lower conductor roll 320, which can ensure that the current distribution in the lower auxiliary tank 300 is more uniform and ensure the balance of the electroplating process and the electrolyzing process.

[0038] An end of the lower auxiliary electrode 330 is connected with a lower electrode wire 331, and the lower electrode wire 331 is connected with the negative output end of the second power source; and ends of the lower conductor roll 320 are connected with lower conductive slip rings 323 through lower conducting bars 322, the lower conductive slip ring 323 located on one end of the lower conductor roll 320 is connected with the negative output end of the first power source, and the lower conductive slip ring 323 located on the other end of the lower conductor roll 320 is connected with the positive output end of the second power source.

[0039] In a specific embodiment, one end of a distribution hole 342 is communicated with a lower bath inlet 341 arranged on the tank body, and the plating pool bath 401 and the lower tank bath 301 are communicated through the lower bath inlet 341, a distribution pipe 340 and an opening on an upper end of the lower auxiliary tank 300. In the embodiment, to achieve the consistent concentration of the lower tank bath 301 in the lower auxiliary tank 300 and avoid high concentration at the lower bath inlet 341 and low concentration in the position away from the lower bath inlet 341, the distribution pipe 340 is arranged in the lower auxiliary tank 300, the distribution pipe 340 is uniformly provided with a plurality of distribution holes 342, and the distribution pipe 340 is communicated with the lower bath inlet 341 in a side wall of the lower auxiliary tank 300 as the lower tank bath 301 overflows from the opening on the upper end.

[0040] In another specific embodiment, one end of the distribution hole 342 is communicated with the lower bath inlet 341 arranged in the lower tank body 310, the lower tank body 310 is also provided with a lower bath outlet (not shown in the figure, the same below), and the plating pool bath 401 and the lower tank bath 301 are communicated through the lower bath inlet 341, the distribution pipe 340 and the lower bath outlet.

[0041] As show in Fig. 1, Fig. 3, Fig. 6 and Fig. 9, the auxiliary tank and the electroplating pool 400 of the present invention are fixed above the main body tank 100, main tank bath 101 is arranged in the main body tank 100, and the auxiliary tank bath and the plating pool bath 401 are communicated with the main tank bath 101. Preferably, a side wall of the main body tank 100 is provided with a first main tank vertical plate 110, a second main tank vertical plate 120 and a third main tank vertical plate 130, the first main tank vertical plate 110 is located inside the second main tank vertical plate 120, and the second main tank vertical plate 120 is located inside the third main tank vertical plate 130.

[0042] Ends of the conductor roll are sheathed on the first main tank vertical plate 110 through bearings, the ends of the conductor roll are connected with conductive slip rings through conducting bars, an inner end of the

conducting bar is connected with the conductor roll across the second main tank vertical plate 120, an outer end is connected with the conductive slip ring across the third main tank vertical plate 130, the conductive slip ring located on one end of the conductor roll is connected with the negative output end of the first power source, and the conductive slip ring located on the other end of the conductor roll is connected with the positive output end of the second power source.

[0043] Specifically, both ends of the upper conductor roll 220 are sheathed on an upper side of the first main tank vertical plate 110 through upper bearings 221, an inner end of the upper conducting bar 222 is connected with the upper conductor roll 220 across the second main tank vertical plate 120, an outer end is connected with the upper conductive slip ring 223 across the third main tank vertical plate 130, the upper conductive slip ring 223 located on one end of the upper conductor roll 220 is connected with the negative output end of the first power source, and the upper conductive slip ring 223 located on the other end of the upper conductor roll 220 is connected with the positive output end of the second power source. Both ends of the lower conductor roll 320 are sheathed on the first main tank vertical plate 110 through lower bearings 321 and located below the upper conductor roll 220, an inner end of the lower conducting bar 322 is connected with the lower conductor roll 320 across the second main tank vertical plate 120, an outer end is connected with the lower conductive slip ring 323 across the third main tank vertical plate 130, the lower conductive slip ring 323 located on one end of the lower conductor roll 320 is connected with the negative output end of the first power source, and the lower conductive slip ring 323 located on the other end of the lower conductor roll 320 is connected with the positive output end of the second power source.

[0044] The main body tank 100 in the present invention not only provides an intermediate channel for the bath between the auxiliary tank and the main body tank 100 to circulate, but also can support the auxiliary tank and the main body tank 100. In addition, when the lower auxiliary tank 300 is not provided with a lower bath outlet, the lower tank bath 301 can overflow directly from an upper edge of the lower auxiliary tank 300 and flow into the main body tank 100, and the communication among the lower tank bath 301, the main tank bath 101 and the plating pool bath 401 is realized through a very fine liquid pipeline.

[0045] As shown in Fig. 10, in the implementation process of the present invention:

The positive output end V1+ of the first power source is connected with the electroplating anode, and the negative output end V1- is connected with one end of the conductor roll (the upper conductor roll 220 and the lower conductor roll 320). The positive output end V1+ of the first power source, the electroplating anode, the plating pool bath, the conductor roll and the negative output end V1- of the first power source are connected in sequence

to form a complete current loop so as to realize the process of copper electroplating on the surface of the plating product.

[0046] The positive output end V2+ of the second power source is connected with the other end of the conductor roll (the upper conductor roll 220 and the lower conductor roll 320), and the negative output end V2- is connected with the auxiliary electrode. The positive output end V2+ of the second power source, the conductor roll, the auxiliary tank bath, the auxiliary electrode and the negative output end V2- of the second power source are connected in sequence to form a complete current loop so as to realize the electrolyzing process of copper on the surface of the conductor roll (the upper conductor roll 220 and the lower conductor roll 320).

[0047] Since the current in the electroplating process is much larger than that in the electrolyzing process, the connection of the conductor roll (the upper conductor roll 220 and the lower conductor roll 320) to the second power source has no influence on the process of communicating with the first power source and realizing copper electroplating.

[0048] The circuit connection realizes: the conductor roll (the upper conductor roll 220 and the lower conductor roll 320) acts as a cathode in the process of realizing copper plating of the plating product in conjunction with the electroplating anode and acts as an anode in the process of electrolyzing copper in conjunction with the auxiliary electrode so as to ensure the balance between copper electroplating and copper electrolysis on the surface of the conductor roll (the upper conductor roll 220 and the lower conductor roll 320) on the premise of realizing copper plating, thus realizing no residual copper on the conductor roll (the upper conductor roll 220 and the lower conductor roll 320).

[0049] In the embodiment, the first power source comprises a first rectifier 01 connected with a three-phase power source, the second power source comprises a second rectifier 02 connected with a three-phase power source, and a circuit breaker is respectively arranged on branch circuits where the two rectifiers are located for circuit protection. In other embodiments, the first power source and the second power source can also be pulse power sources.

[0050] In the present invention, the conductor roll is treated by electrolysis, which avoids copper deposition on the conductor roll in the process of electroplating the plating product and solves the problem that the influence of bath cannot be considered in the traditional physical copper removal methods; the present invention can effectively solve the problem of residual copper and improve the electroplating quality of the plating product; and the present invention makes the conductor roll act as a cathode when electroplating the plating product and act as an anode for copper electrolysis when mating with the auxiliary electrode by installing the auxiliary tank and the auxiliary electrode and adding the electrolysis loop in the auxiliary tank, which realizes the balance of copper elec-

troplating and copper electrolysis on the conductor roll.

[0051] It should be understood that, for those ordinary skilled in the art, improvements and alternations can be made according to the above description, and all these improvements and alternations shall belong to the protection scope of appended claims of the present invention.

[0052] The patent of present invention is exemplarily described above in combination with the drawings. Obviously, the implementation of the patent of the present invention is not limited by the above modes. Various improvements made by adopting the method ideas and technical solutions of the patent of the present invention or the ideas and technical solutions of the patent of the present invention directly applied to other occasions without improvements shall be within the protection scope of the present invention.

[0053] In the present invention, an electrolysis device for the conductor roll is added before electroplating, and by adding an auxiliary electrode connected in series with the conductor roll, the bath in the auxiliary tank forms a loop, the conductor roll acts as an anode for electrolysis, the electrolysis of the bath near the conductor roll can be realized on the premise of completing electroplating by the conductor roll so that the copper electroplating process and the copper electrolyzing process are balanced on the conductor roll to avoid residual copper on the conductor roll so as to improve the copper plating quality of the plating product, and only a small electrolytic cell is needed to achieve the whole function without increasing the procedure of the electroplating process, so the present invention has practicality.

Claims

1. A device for preventing copper plating of a conductor roll, comprising:

an electroplating pool, wherein plating pool bath and an electroplating anode are arranged in the electroplating pool;

an auxiliary tank, in which auxiliary tank bath, an auxiliary electrode completely immersed in the auxiliary tank bath, and a conductor roll partly immersed in the auxiliary tank bath are arranged, and a plating product rolls over the conductor roll which is not immersed in the auxiliary tank bath, and passes the electroplating anode; the auxiliary tank bath is communicated with the plating pool bath, the electroplating anode is connected to a positive output end of a first power source, one end of the conductor roll is connected to a negative output end of the first power source, the other end of the conductor roll is connected to a positive output end of a second power source, and the auxiliary electrode is connected to a negative output end of the second power

source.

2. The device for preventing copper plating of a conductor roll according to claim 1, wherein the auxiliary tank comprises an upper auxiliary tank with an opening on a lower end, an upper conductor roll is arranged at the opening, the upper conductor roll is hermetically connected with the upper auxiliary tank, an upper side of the upper conductor roll is immersed in upper tank bath in the upper auxiliary tank, a lower side is exposed from the upper auxiliary tank, and the plating product rolls over the lower side of the upper conductor roll.
3. The device for preventing copper plating of a conductor roll according to claim 2, wherein an upper auxiliary electrode is arranged in the upper tank bath, and the upper auxiliary electrode is located directly above the upper conductor roll.
4. The device for preventing copper plating of a conductor roll according to claim 2, wherein sides of the upper auxiliary tank are provided with an upper bath inlet and an upper bath outlet, and the upper tank bath and the plating pool bath are communicated through the upper bath inlet and the upper bath outlet.
5. The device for preventing copper plating of a conductor roll according to claim 1, wherein the auxiliary tank comprises a lower auxiliary tank with an opening on an upper end, a lower conductor roll is arranged at the opening, a lower side of the lower conductor roll is immersed in lower tank bath in the lower auxiliary tank, an upper side is exposed from the lower tank bath, and the plating product rolls over the upper side of the lower conductor roll.
6. The device for preventing copper plating of a conductor roll according to claim 5, wherein a lower auxiliary electrode is arranged in the lower tank bath, and the lower auxiliary electrode is located directly below the lower conductor roll.
7. The device for preventing copper plating of a conductor roll according to claim 1, wherein an end of the auxiliary electrode is connected with an electrode wire, and the electrode wire is connected with the negative output end of the second power source; and ends of the conductor roll are connected with conductive slip rings through conducting bars, the conductive slip ring located on one end of the conductor roll is connected with the negative output end of the first power source, and the conductive slip ring located on the other end of the conductor roll is connected with the positive output end of the second power source.

8. A method for preventing copper plating of a conductor roll, comprising:

connecting a conductor roll to a negative output
end of a first power source; 5
connecting an electroplating anode to a positive
output end of the first power source;
electroplating a plating product passing through
plating pool bath by the conductor roll and the
electroplating anode after being electrified, fur- 10
ther comprising an electrolyzing step of the con-
ductor roll: connecting the conductor roll to a
positive output end of a second power source
and connecting an auxiliary electrode to a neg- 15
ative output end of a second power source ac-
cordingly for electrolyzing the conductor roll so
as to prevent copper deposition on the conduc-
tor roll when electroplating the plating product.

9. The method for preventing copper plating of a con- 20
ductor roll according to claim 8, comprising: arrang-
ing an auxiliary tank, and partly immersing the con-
ductor roll in auxiliary tank bath in the auxiliary tank;

connecting an auxiliary electrode in the auxiliary 25
tank to the negative output end of the second
power source;
connecting the conductor roll to the positive out-
put end of the second power source, for electro- 30
lyzing of the conductor roll through the second
power source, the auxiliary electrode and the
auxiliary tank bath.

10. The method for preventing copper plating of a con- 35
ductor roll according to claim 8, comprising: connect-
ing one end of the conductor roll to the negative out-
put end of the first power source, and connecting the
other end to the positive output end of the second
power source. 40

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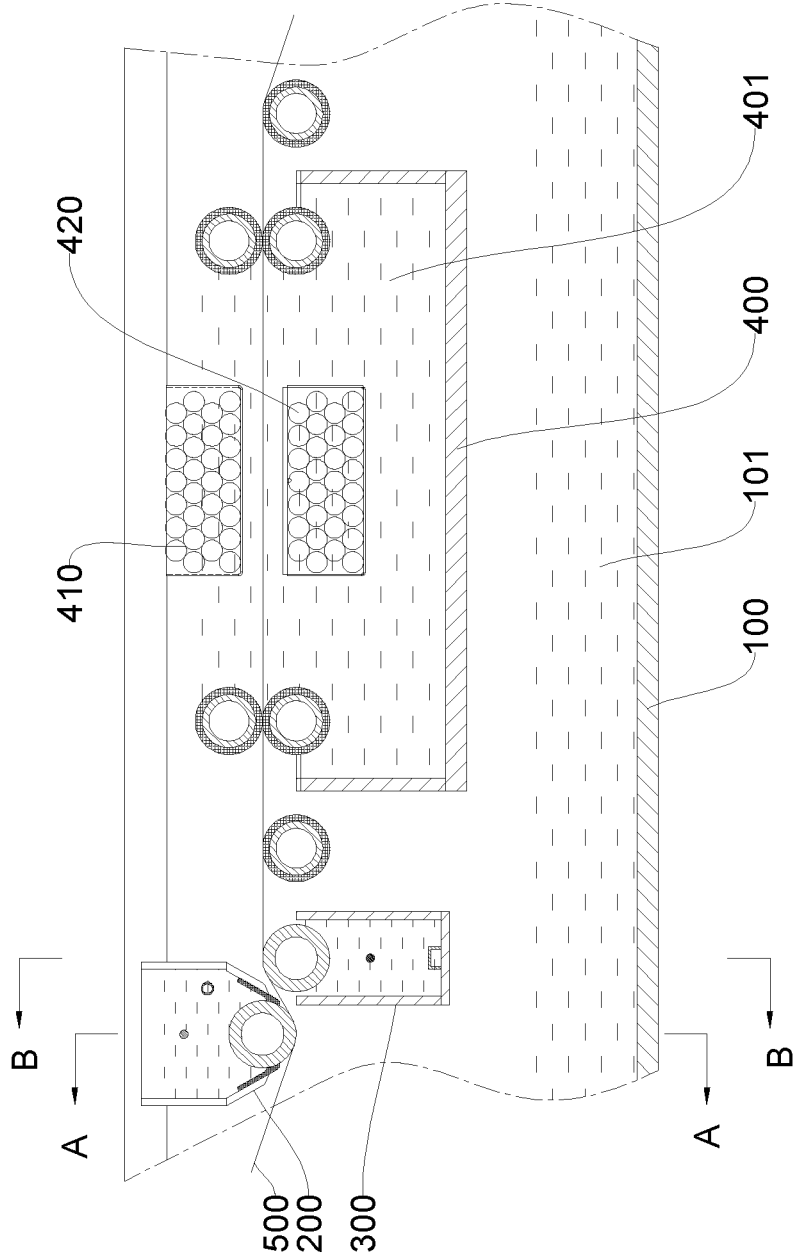


FIG. 1

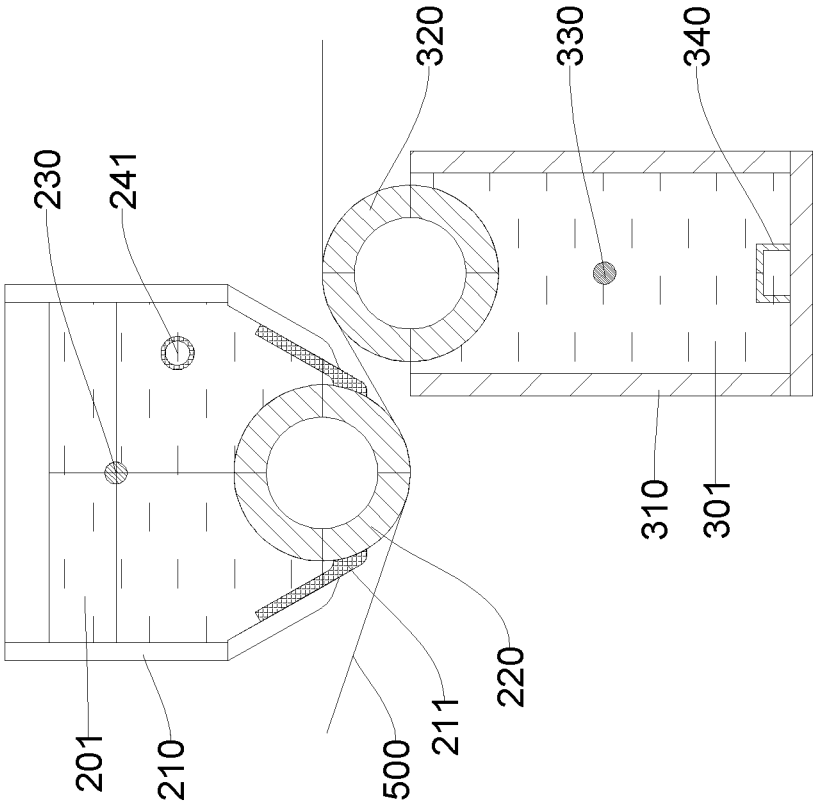
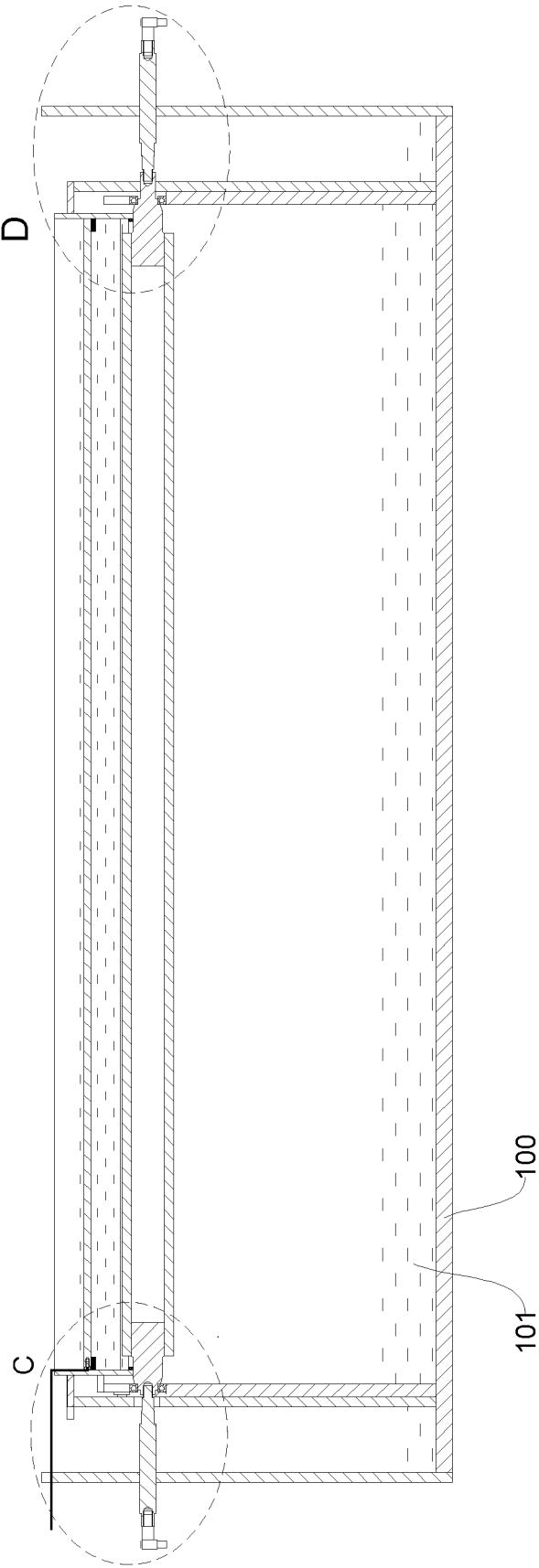
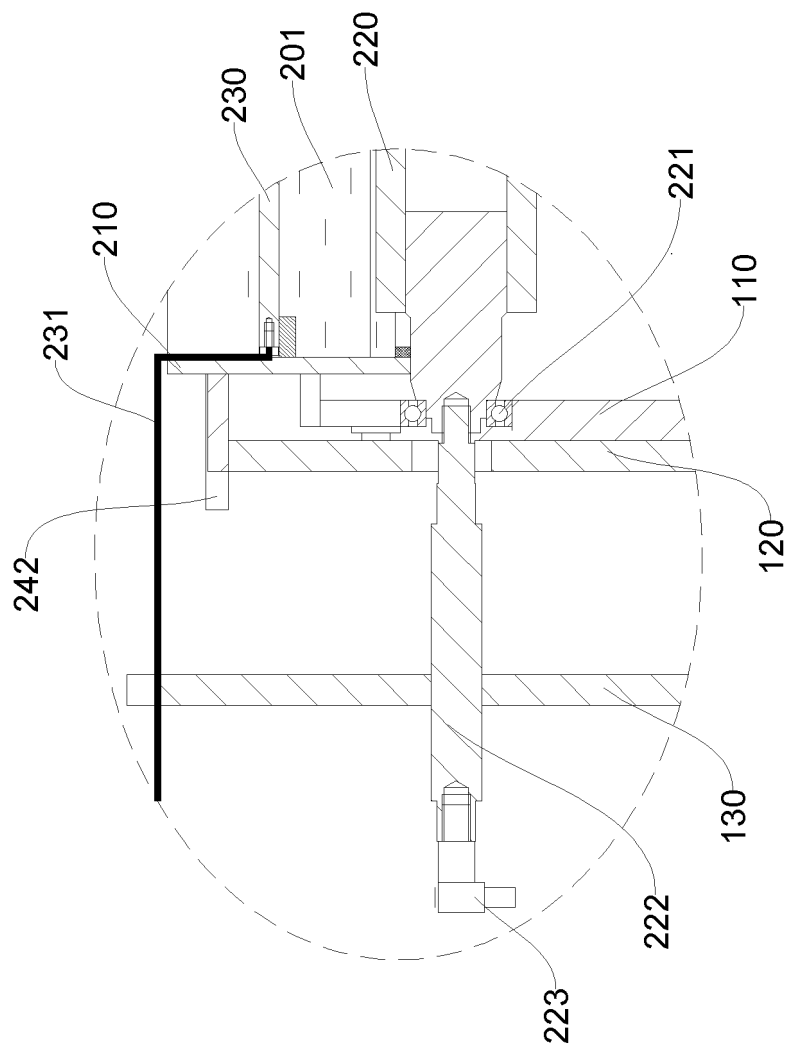


FIG.2





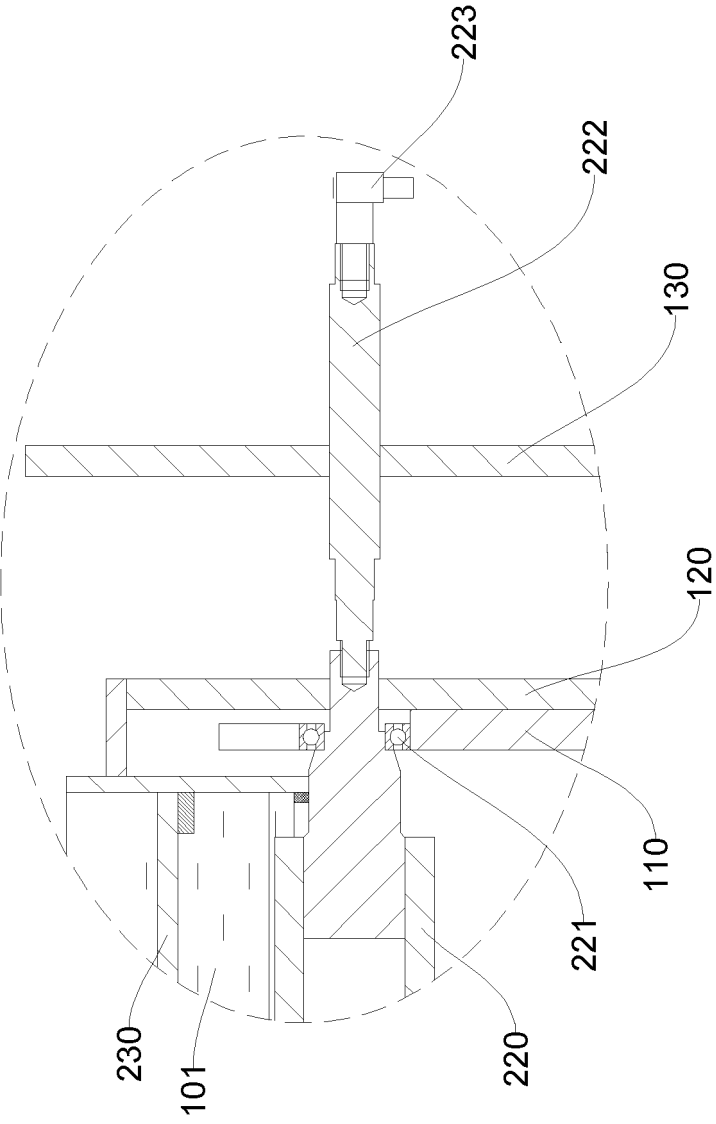
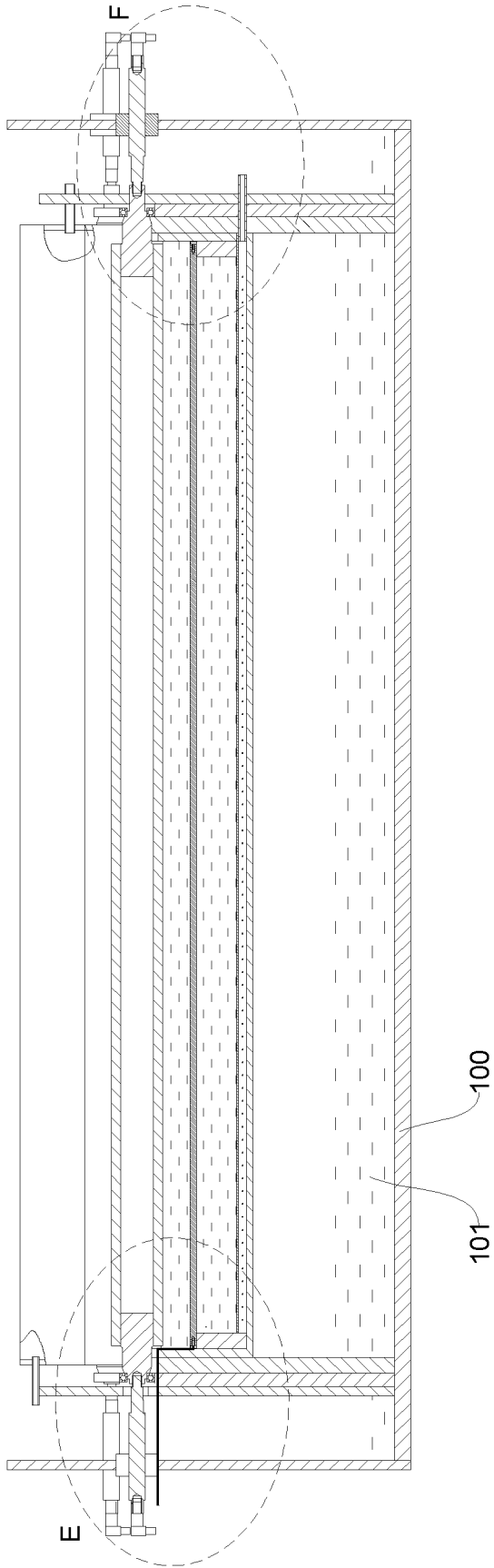


FIG. 5



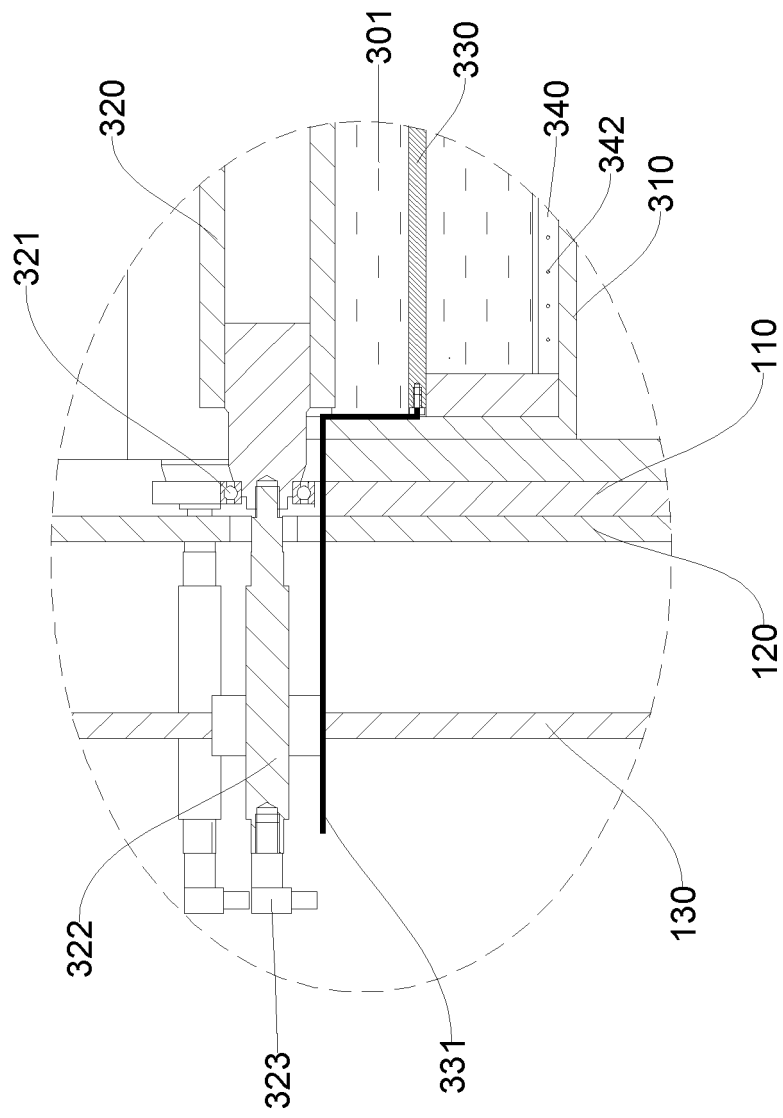


FIG. 7

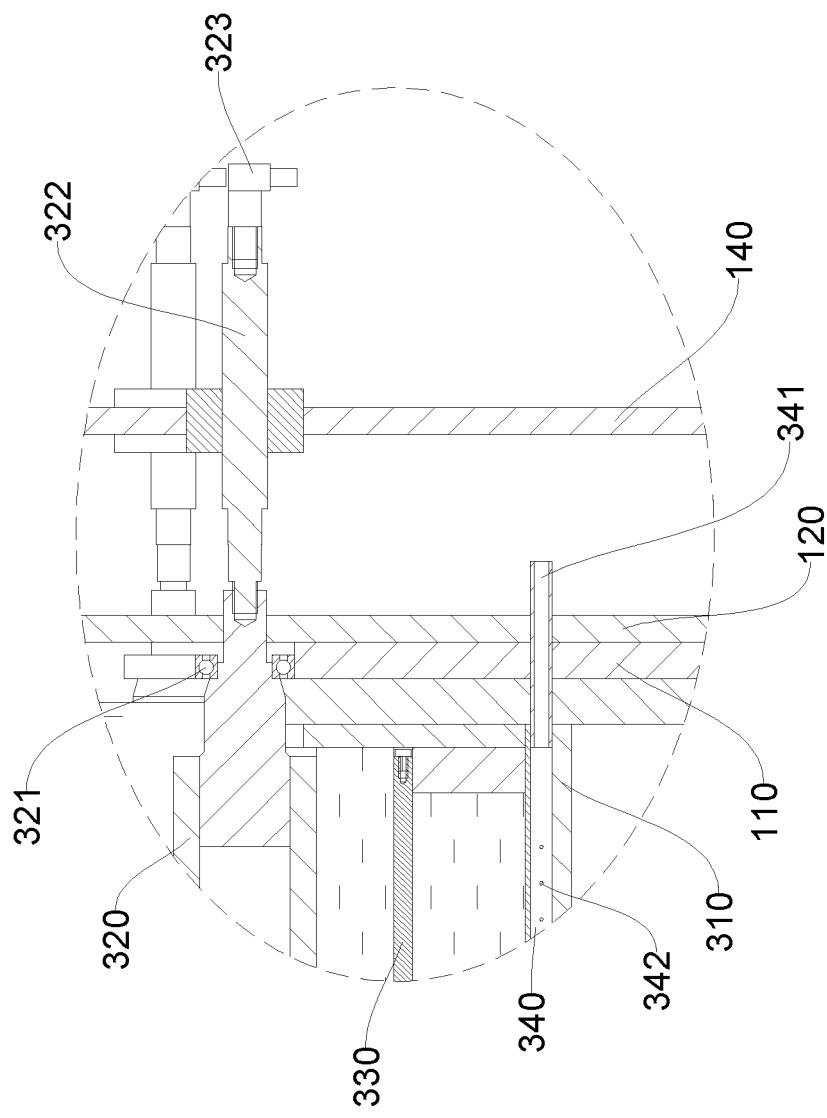


FIG. 8

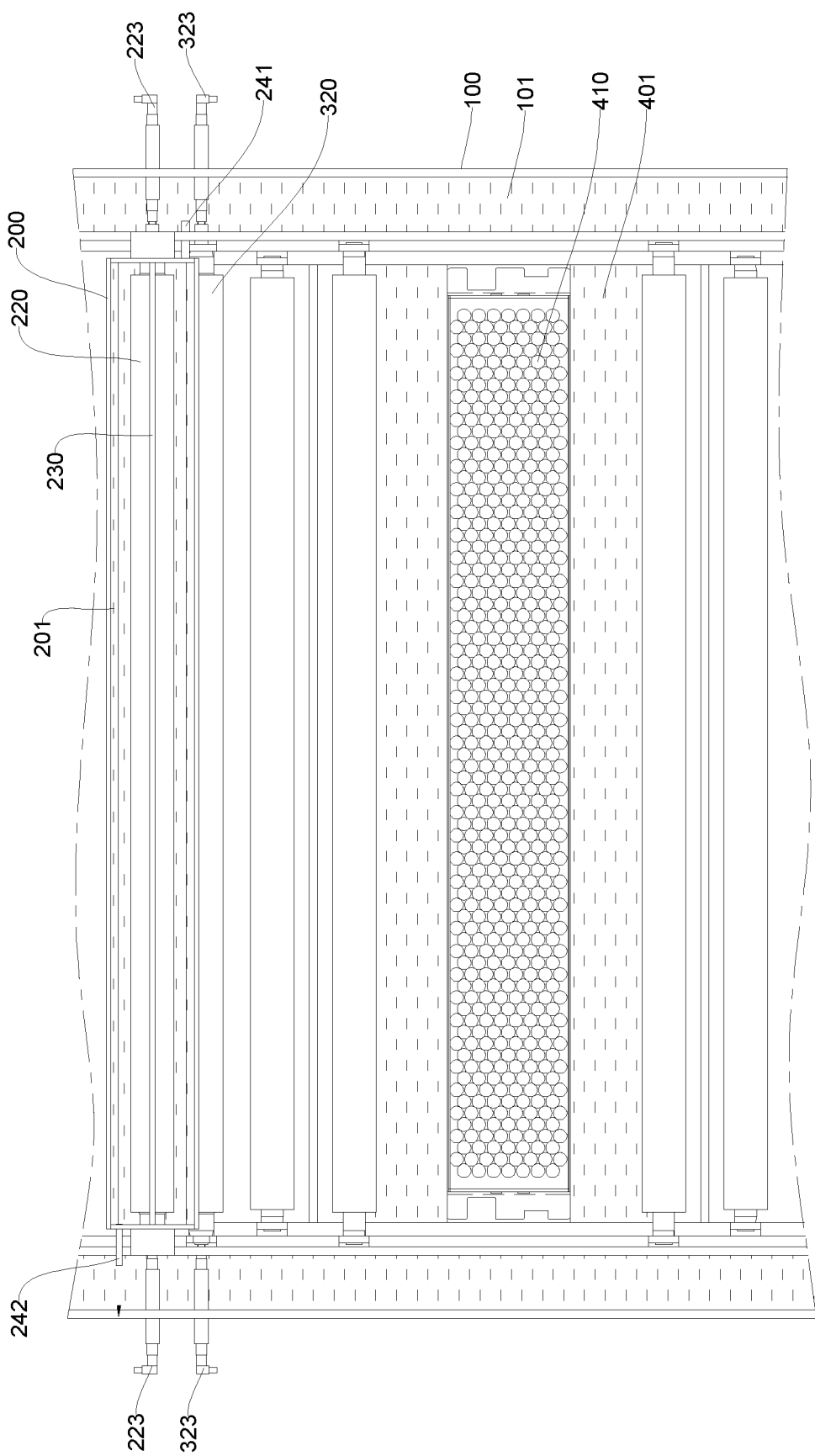


FIG.9

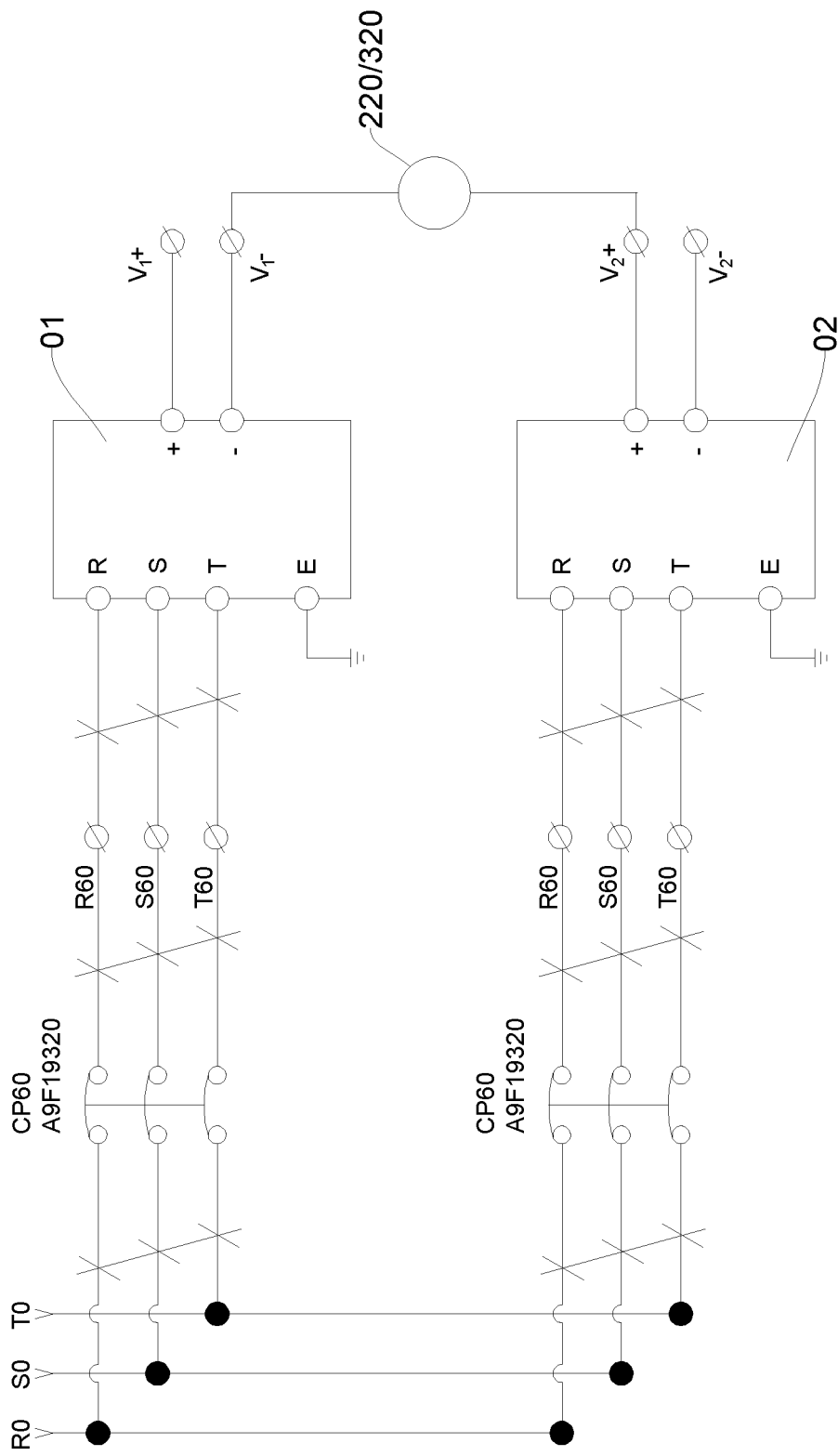


FIG.10

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2021/099457

A. CLASSIFICATION OF SUBJECT MATTER

C25D 17/00(2006.01)i; C25D 17/12(2006.01)i; C25D 3/38(2006.01)i; C25D 21/00(2006.01)i; C25D 7/00(2006.01)i;
C25C 1/12(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

C25D17/-; C25D3/-; C25D21/-; C25D7/-; C25C1/-

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNABS, CNTXT, CNKI, VEN, WPABSC, USTXT, WOTXT, Web of Science: 重庆金美新材料科技有限公司, 臧世伟, 刘文卿, 阴极辊, 导电辊, 辅助电极, 辅助阴极, 镀铜, 铜箔, 辅助槽, 电解槽, 接液槽, 电解, 电沉积, zang shiwei, liu wenqing, cathode roll?, conductor roll?, auxilia+, electrolyt+, Cu, copper, foil?, electrodeposit+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 112663119 A (CHONGQING JIMAT NEW MATERIAL TECHNOLOGY CO., LTD.) 16 April 2021 (2021-04-16) claims 1-10	1-10
X	CN 202047151 U (KINGBOARD (LIANZHOU) COPPER FOIL CO., LTD.) 23 November 2011 (2011-11-23) description paragraphs [0007], [0011], figure 1	8, 10
Y	CN 202047151 U (KINGBOARD (LIANZHOU) COPPER FOIL CO., LTD.) 23 November 2011 (2011-11-23) description paragraphs [0007], [0011], figure 1	1-7, 9
Y	CN 202688479 U (WARNER INTERNATIONAL (TONGLING) ELECTRONIC MATERIAL CO., LTD.) 23 January 2013 (2013-01-23) description, paragraph [0004], and figure 2	1-7, 9
A	CN 105177658 A (CNMC ALBETTER ALBRONZE CO., LTD.) 23 December 2015 (2015-12-23) entire document	1-10

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search

19 July 2021

Date of mailing of the international search report

16 August 2021

Name and mailing address of the ISA/CN

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Facsimile No. (86-10)62019451

Authorized officer

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INTERNATIONAL SEARCH REPORT

International application No.

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C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2012073977 A1 (TACHI YASUAKI et al.) 29 March 2012 (2012-03-29) entire document	1-10
A	KR 101681485 B1 (KOREA INSTITUTE OF SCIENCE AND TECHNOLOGY) 01 December 2016 (2016-12-01) entire document	1-10

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2021/099457

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 112663119 A	16 April 2021	None	
CN 202047151 U	23 November 2011	None	
CN 202688479 U	23 January 2013	None	
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		TW I376432 B	11 November 2012
KR 101681485 B1	01 December 2016	None	

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REFERENCES CITED IN THE DESCRIPTION

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- CN 202898572 U [0003]